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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
LC 448

August 29, 1935.

# PUBLICATIONS ON RADIOMETRY FROM THE NATIONAL BUREAU OF STANDARDS.

The publications of the National Bureau of Standards are consecutively numbered in each series. The early bureau papers were issued in journal form as Bulletins, and later as Scientific Papers (S.); also Technologic Papers (T.). Recent papers of the bureau are issued in the Journal of Research (separates designated as Research Papers (R.P.)). Some of these papers are out of print. Others are obtainable only from the Superintendent of Documents, Government Printing Office, Washington, D. C., (prepaid) at the prices indicated.

These papers and those appearing in non-governmental journals may be consulted at various libraries or copies of the journals may be obtained from the publisher. In some cases, reprints of the papers are still available and may be obtained on request to the author.

## Synopsis of Investigations.

The investigations in radiometry were conducted for the purpose of determining the absorptive, emissive and reflective properties of matter, for thermal radiation of various wave lengths extending from the extreme ultraviolet through the visible and into the remote infrared spectrum.

The work has involved:

I. The development and investigation of standard instruments and methods of measuring thermal radiation as applied to various problems in astronomy, biology, photochemistry, physiology, psychology and physics; the measurement of thermal radiation in absolute value; and the evaluation of ultraviolet for use in medicine.

II. The determination of the fundamental constants of radiation; and the development of standards of radiation.

III. The determination of the (a) absorptive, (b) the emissive, and (c) the reflective properties of substances for thermal radiation.

IV. The investigation of the thermoelectric and photoelectric properties of materials for use as radiometers.

V. The investigation of the visibility of radiation; nocturnal radiation; and the photochemical action of radiation.

VI. The investigation of the germicidal and erythemogenic action of radiation.

VII. Reports and papers dealing with applications of radiometry to illumination and medicine; preliminary announcements.

Subjoined is a partial list of publications on radiometry, arranged according to the foregoing analysis. The unclassified papers, which usually discuss the practical significance of the work are listed under the various publications in which they were published. The contributions to the Physical Review are principally abstracts of papers presented before the American Physical Society.

## I. INSTRUMENTS AND METHODS OF RADIOMETRY.

The publications of the National Bureau of Standards are: Bulletins (Bul.); Scientific Papers (S); Technologic Papers (T); Miscellaneous Publications (M); and Research Papers (RP).

### (a) GENERAL SURVEY

A vacuum radiometer, W. W. Coblentz, Bul.BS 2, 479 (1907); S46, 5¢.

Instruments and methods used in radiometry, I., W. W. Coblentz, Bul. BS 4, 391 (1908); S85, 15¢.

Instruments and methods used in radiometry, II., W. W. Coblentz, Bul. BS 9, 7 (1912); S188, 20¢.

Various modifications of bismuth-silver thermopiles having a continuous absorbing surface, W. W. Coblentz, Bul. BS 11, 131 (1914); S229, 20¢.

Studies of instruments for measuring radiant energy in absolute value; an absolute thermopile, W. W. Coblentz and W. B. Emerson, Bul. BS 12, 503 (1916); S261, 15¢.

Sensitivity and magnetic shielding tests of a Thomson galvanometer for use in radiometry, W. W. Coblentz, Bul. BS 13, 423 (1916); S282, 10¢.

Instruments and methods of radiometry, III, selective radiometers, W. W. Coblentz, Bul. BS 14, 507 (1918); S319, 10¢.

Methods for computing and intercomparing radiation data, W. W. Coblentz, BS Sci. Pap. 15, 617 (1920); S360, 5¢.

A new spectropyrheliometer, W. W. Coblentz and H. Kahler, BS Sci. Pap. 16, 233 (1920); S378, 5¢.

A portable vacuum thermopile, W. W. Coblentz, BS Sci. Pap. 17, 187 (1921); S413, 5¢.

Radiometry and invisible signaling; war work of the National Bureau of Standards, Misc. Pub. BS No. 46, 133 and 245 (1921); M46, 70¢.

A portable ultraviolet intensity meter, W. W. Coblentz and R. Stair, BS J. Research 12, 231 (1934); RP647, 5¢.

Methods and apparatus used in spectroradiometry, W. W. Coblentz, J. Opt. Soc. Am. June, 1923; Radiology, Feb. 1928.

Radiometer Aufstellung für einen Monochromator, W. W. Coblentz and C. Leiss, Zeits. f. Instrum. Kunde, 34, 14 (1914).

Construction and use of thermopiles, and iron-clad Thomson galvanometers; the analysis of spectral radiation by filter radiometry, W. W. Coblentz, Handbook on Radiation Measurement, edited by W. E. Forsythe; published by the National Research Council.

## (b) STELLAR AND PLANETARY RADIOMETRY; ULTRAVIOLET RADIOMETRY.

A comparison of stellar radiometers and radiometric measurements on 110 stars, W. W. Coblentz, Bul. BS 11, 613 (1915); S244, 15¢.

Radiometer measurements of 110 stars with the Crossley reflector, W. W. Coblentz, Lick Obs. Bul. No. 226 (1915).

Tests of stellar radiometers and measurements of the energy distribution of 16 stars, W. W. Coblentz, BS Sci. Pap. 17, 725 (1922); S438, 10¢.

Further tests of stellar radiometers and some measurements of planetary radiation, W. W. Coblentz, BS Sci. Pap. 18, 535 (1922); S460, 10¢.

Temperature estimates of the planet Mars, W. W. Coblentz, Astronom. Nachrichten 224, 362 (1925) and 226, 422 (1926); BS Sci. Pap. 20, 371 (1925); S512, 10¢.

Some measurements of the spectral components of planetary radiation and planetary temperatures, 1924, W. W. Coblentz and C. O. Lampland, J. Frank. Inst., June and July, 1925.

New measurements of planetary radiation and planetary temperatures, W. W. Coblentz and C. O. Lampland, Proc. Nat. Acad. Sci., January, 1925.

Measurements of solar, sky, nocturnal and stellar radiation, W. W. Coblentz, Glazebrook's Dictionary of Applied Physics, 3, 715 (1923).

Climatic conditions on Mars, W. W. Coblentz, Pop. Astron., June-July, 1925.

Is there life on other planets, W. W. Coblentz, The Forum, November, 1925.

Planetary temperatures derived from water-cell transmissions, D. H. Menzel, W. W. Coblentz and C. O. Lampland, Astrophys. J., April, 1926.

Further radiometric measurements and temperature estimates of the planet Mars, 1926, W. W. Coblentz and C. O. Lampland, BS Sci. Pap. 22, 237 (1927); S553, 15¢.

Spectral classification of Coblentz' stellar measurements at Lick Observatory, E. B. Frost, Pop. Astronomy 24, February 1916.

Thermocouple measurements of stellar and planetary radiation, W. W. Coblentz, Popular Astron., February, 1923.

Measurements of planetary radiation, W. W. Coblentz and C. O. Lampland, Lowell Obs., Bul. 3, 91 (1925); No. 85.

Die Ergebnisse der bisherigen Temperaturmessungen des Planeten Mars, W. W. Coblentz, Die Naturwissenschaften, 15, 62 (1927).

Radiometric measurements of stellar and planetary temperatures, W. W. Coblentz, Nature 116, 372 and 439 (1925).

Radiometric determination of the temperature of Mars in 1924, W. W. Coblentz, Nature 116, 472 (1925).

## (c) THE EVALUATION OF ULTRAVIOLET FOR USE IN MEDICINE; STANDARDIZATION OF DOSAGE OF ULTRAVIOLET RADIATION.

Data on ultraviolet solar radiation and solarization of window materials, W. W. Coblentz and R. Stair, BS J. Research 3, 629 (1929); RP 113, 15¢.

Measurement of extreme ultraviolet solar radiation by a filter method, W. W. Coblentz and R. Stair, BS J. Research 6, 951 (1931); RP 318, 10¢.

A balanced thermocouple and filter method of ultraviolet radiometry with practical applications, W. W. Coblentz and R. Stair, BS J. Research 7, 723 (1931); RP 370, 10¢.

Tests of a balanced thermocouple and filter radiometer as a standard ultraviolet dosage intensity meter, W. W. Coblentz, R. Stair, and J. M. Hogue, BS J. Research 8, 759 (1932); RP 450, 10¢.

Measurements of ultraviolet solar radiation in various localities, W. W. Coblentz, R. Stair and J. M. Hogue, BS J. Research 10, 79 (1933); RP 517, 5¢.

A portable ultraviolet intensity meter, consisting of a balanced amplifier, photoelectric cell, and microammeter, W. W. Coblentz and R. Stair, BS J. Research 12, 231 (1934); RP 647, 5¢.

Methods of measuring ultraviolet radiation, W. W. Coblentz, Radiology, 10, 116 (1928).

Instruments for measuring ultraviolet radiation and the unit of dosage in ultraviolet therapy, W. W. Coblentz, Medical J. and Record, 130, 691 (1929). Reprinted in British J. of Radiology 3, 354 (1930).

Choix dúne Unité de Mesure pour les Rayons Ultraviolet Utilisés en Médicine, W. W. Coblentz, I$^{er}$ Congrès International d' Actinologie, Paris, 1929; Ann. de l'Institut d'Actinologie 4, 8 (1930); Medical J. and Record 130, 691 (1929).

Erythemal and radiometric Comparisons of the ultraviolet emitted by various sources as a basis for a specification of the unit of dosage intensity, W. W. Coblentz, II$^{e}$ Congrès International de la Lumière, Copenhagen, 1932; Comptes-rendus du Congrès, p. 322 (1932).

Considerations relative to the evaluation of ultraviolet radiation in absolute units, W. W. Coblentz, Amer. J. Roentgenology and Radium Therapy, 33, 793 (1935).

The evaluation of ultraviolet radiation for use in medicine, W.W. Coblentz, Puerto Rico J. Public Health and Tropical Medicine 11, No. 1, p. 1, September, 1935.

Factors affecting ultraviolet solar radiation intensities, W.W. Coblentz and R. Stair, BS J. Research 15, 123 (1935); RP 816, 5¢.

Ultraviolet solar intensities in the tropics, W. W. Coblentz, Puerto Rico J. Public Health and Tropical Medicine 11, No. 1, September, 1935.

## II. THE DETERMINATION OF THE FUNDAMENTAL CONSTANTS OF RADIATION, AND THE DEVELOPMENT OF STANDARDS OF RADIATION.

The constants of spectral radiation of a uniformly heated enclosure or so-called black body, I., W. W. Coblentz, BS Bul. 10, 1 (1913); S 204, 20¢.

Constant of total radiation, W. W. Coblentz and W. B. Emerson, BS Bul. 12, 503 (1916); S 261, 15¢.

Present status of the determination of the constant of total radiation from a black body, W. W. Coblentz, BS Bul. 12, 553 (1916); S 262, 10¢.

Constants of spectral radiation of a uniformly heated enclosure or so-called black body, II., W. W. Coblentz, BS Bul. 13, 459 (1916); S 284, 10¢.

The mechanical equivalent of light, W. W. Coblentz and W. B. Emerson, BS Bul. 14, 255 (1917); S 305, 5¢.

Constants of radiation of a uniformly heated enclosure, W. W. Coblentz, BS Sci. Pap. 15, 529 (1920); S 357, 5¢.

Present status of the constants and verifications of the laws of thermal radiation of a uniformly heated enclosure, W. W. Coblengz, BS Sci. Pap. 17, 8 (1920); S 406, 10¢; also in Jahrbuch Radioakt. u. Elektronik, July, 1913.

The mechanical equivalent of light, H. E. Ives, W. W. Coblentz and F. E. Kingsbury, Phys. Rev., N.S., 5, 259 (1915).

Present status of the radiation constants, W. W. Coblentz, Trans. Amer. Inst. Mining and Metallurg. Eng., Bul. No. 152, August, 1919.

Calculation of Planck's constant, $C_2$ (data by Coblentz), J. H. Dellinger, BS Bul. 13, 535 (1917); S 287, 10¢.

Calculation of the constants of Planck's radiation equation (data by Coblentz), H. M. Roeser, BS Bul. 14, 237 (1917); S 304, 10¢.

Determination of the radiation constants, W. W. Coblentz, Glazebrook's Dictionary of Applied Physics 2, 541 (1923).

Radiation constants, W. W. Coblentz, Int. Crit. Tables 5, 237 (1929).

Measurements of standards of radiation in absolute value, W.W. Coblentz, BS Bul. 11, 87 (1914).

The present status of the standards of thermal radiation maintained by the National Bureau of Standards, W. W. Coblentz and R. Stair, BS J. Research 11, 79 (1933); RP 578, 5¢.

## III. THE DETERMINATION OF THE ABSORPTIVE, EMISSIVE AND RELECTIVE PROPERTIES OF MATERIALS.

### (a) GENERAL SURVEY

Investigations of infra-red spectra: Part I, absorption spectra; Part II, emission spectra, W. W. Coblentz, Publ. No. 35, Carnegie Institution of Washington, 1905.

Investigations of infra-red spectra: Part III, transmission spectra; Part IV, reflection spectra, W. W. Coblentz, Publ. No. 65, Carnegie Institution of Washington, 1906.

Investigations of infra-red spectra: Part V, reflection spectra; Part VI, transmission spectra, Part VII, emission spectra, W. W. Coblentz, Publ. No. 97, Carnegie Institution of Washington, 1908.

A physical study of the fire fly, W. W. Coblentz, Publ. No. 164, Carnegie Institution of Washington, 1911.

### (b) ABSORPTION SPECTRA; TRANSPARENCY OF WINDOW GLASSES TO ULTRA-VIOLET, FOR USE IN MEDICINE.

Some optical properties of iodine, W. W. Coblentz, Phys. Rev., January, February, and July, 1903.

Radiometric investigation of infra-red absorption and reflection spectra, W. W. Coblentz, BS Bul. 2, 457 (1907); S 45, 10¢.

Radiometric investigation of water of crystallization, light filters and standard absorption bands, W. W. Coblentz, BS Bul. 7, 619 (1911); S 168, 20¢.

Absorption reflection and dispersion constants of quartz, W.W. Coblentz, BS Bul. 11, 471 (1914); S 237, 5¢.

Spectroradiometric investigation of the transmission of various substances, I., W. W. Coblentz, W. B. Emerson, and M. B. Long, BS Bul. 14, 653 (1918); S 325, 5¢.

Infra-red transmission and reflection data of standard lens and prism material, W. W. Coblentz, BS Sci. Pap. 16, 701 (1920); S 401, 5¢; Glazebrook's Dict. App. Phys., 4, 136 (1923).

Spectroradiometric investigation of the transmission of various substances, II., W. W. Coblentz, BS Sci. Pap. 17, 267 (1921); S 418, 5¢.

Glasses for protecting the eyes from injurious radiations, W. W. Coblentz and W. B. Emerson, BS Tech. Pap. No. 93, 1st Ed., 1917; 2nd Ed. 1918; 3rd Ed. 1919, 10¢.

Transmissive properties of eye protective glasses and other substances, W. W. Coblentz and R. Stair, BS Tech. Pap. 22, 555 (1928); T 369, 10¢.

Some measurements of the transmission of ultraviolet radiation through various fabrics, W. W. Coblentz, R. Stair and C. W. Schoffstall, BS J. Research 1, 105 (1928); RP 6, 5¢.

The Raman spectra of scattered radiation, W. W. Coblentz, Philosoph. Magazine 7, 203 (1929).

Infrared absorption spectra of some plant pigments, R. Stair and W. W. Coblentz, BS J. Research 11, 703 (1933); RP 617, 5¢.

Infrared absorption spectra of plant and animal tissue and of various other substances, R. Stair and W. W. Coblentz, BS J. Research 15, 295 (1935); RP 830.

A non-actinic cobalt-blue glass, W. W. Coblentz and A. N. Finn, J. American Ceramic Society 9, 423 (1926).

Some light transmissive characteristics of eye glasses, W. W. Coblentz, The Central J. of Homeopathy, 5, 597 (1924).

The transmissive properties of tinted lenses, W. W. Coblentz, American J. of Ophthalmology 15, 932 (1932).

Summary data on the transmissibility of ultraviolet radiation through glasses and glass substitutes used for therapeutic purposes, W. W. Coblentz, Trans. Nat. Tuberculosis Association, 34th Meeting, p. 71 (1928).

The status of window materials for transmitting ultraviolet radiation, W. W. Coblentz, Medical J. and Record 131, 596 (1930).

## (c) EMISSION SPECTRA; ULTRAVIOLET LAMPS.
(See also I (c))

Selective radiation from the nernst glower, W. W. Coblentz, BS Bul. 4, 533 (1908); S 91, 10¢.

Selective radiation from various solids, I., W. W. Coblentz, BS Bul. 5, 159 (1908); S 97, 10¢.

Radiation constants of metals, W. W. Coblentz, BS Sci. Pap. 5, 339 (1909); S 105.

Selective radiation from various solids, II., W. W. Coblentz, BS Bul. 6, 301 (1910); S 131, 10¢.

Ber. über die neueren Untersuchungen über Ultrarote Emissions-Spektren, W. W. Coblentz, Jahrb. Radioakt. u. Elektronik, 1910.

Luminous efficiency of the fire fly, H. E. Ives and W. W. Coblentz, BS Bul. 6, 321 (1910); S 132, vol. 6, No. 3, 25¢.

The color of the light emitted by lampyridea, W. W. Coblentz, The Canadian Entomologist, 43, 355 (1911).

Selective radiations from various substances, III, W. W. Coblentz, BS Bul. 7, 243 (1911); S 156, 10¢.

Selective radiations from various substances, IV, W. W. Coblentz, BS Bul. 9, 81 (1912); S 191, 10¢.

Comparison of stellar radiometers and radiometric measurements of 110 stars with the Crossley reflector, W. W. Coblentz, BS Bul. 11, 613 (1915); S 244; also in Bul. Lick Obs., 1916.

Distribution of energy in the visible spectrum of an acetylene flame, W. W. Coblentz and W. B. Emerson, BS Bul. 13, 355 (1916); S 279.

Emissivity of straight and helical filaments of tungsten, W. W. Coblentz, BS Bul. 14, 115 (1917); S 300, 5¢.

Radiation constants of a nitrogen-filled tungsten lamp, W. W. Coblentz, Lighting Journal 2, 35 (1914).

A new spectropyrheliometer and measurements of the component radiations from a quartz mercury vapor lamp, W. W. Coblentz and H. Kahler, BS Sci. Pap. 16, 233 (1920); S 378, 5¢.

Tests of stellar radiometers and measurements of the energy distribution of 16 stars, W. W. Coblentz, BS Sci. Pap. 17, 725 (1922); S 438, 10¢.

Further tests of stellar radiometers and some measurements of planetary radiation, W. W. Coblentz, BS Sci. Pap. 18, 535 (1922); S 460, 10¢.

Emissive tests of paints for decreasing or increasing heat radiation from surfaces, W. W. Coblentz and C. W. Hughes, BS Tech. Pap. 18, 171 (1924); T 254, 5¢.

Spectral energy distribution of the light emitted by plants and animals, W. W. Coblentz and C. W. Hughes, BS Sci. Pap. 21, 521 (1926); S 538, 10¢.

The decrease in ultraviolet and total radiation with usage of quartz mercury vapor lamps, W. W. Coblantz, M. B. Long, and H. Kahler, BS Sci. Pap. 15, 1 (1918); S 330, 5¢.

Effect of solar radiation upon balloons, J. D. Edwards and M. B. Long, BS Tech. Pap. 12, June, 1919; T 128. (Preliminary by Coblentz and Emerson).

Distribution of energy in the spectrum of acetylene flame, W. W. Coblentz, BS Sci. Paper 15, 639 (1920), S 362, 5¢; also J. Frank. Inst., September, 1919.

Radiometric measurements on the carbon arc and other light sources used in phototherapy, W. W. Coblentz, M. J. Dorcas and C. W. Hughes, BS Sci. Pap. 21, 535 (1926); S 539, 5¢. (Abstract in J. Amer. Med. Assocn. 88, 390 (1927).

Physical characteristics of sources of ultraviolet and infrared used in therapy, W. W. Coblentz, Handbook on Physical Therapy, issued by the Council on Physical Therapy of the Amer. Med. Assocn. 1st Ed., 1932; 2nd Ed., 1935.

Sources of artificial radiation and their physical properties, W. W. Coblentz, Principles and Practice of Physical Therapy, 1, chapter 9, 1931; revised 1932.

Light therapy -- The physics of ultraviolet and infrared radiation, W. W. Coblentz, Post-Graduate Seminar in Physical Medicine, under the auspices of the Philadelphia County Medical Society, and the Pennsylvania Physical Therapy Association, April 18-22, 1932. International Clinics, June and September, 1932.

Sources and properties of thermal radiation, especially ultraviolet rays, used in phototherapy, W. W. Coblentz, Physical Therapeutics, 45, 407 (1927); reprinted in Zs. für Gesamte Physikalische Therapie 35, 75 (1928).

Some spectral characteristics of light sources and window materials used in therapy, W. W. Coblentz, Trans. Illum. Eng. Soc., March, 1928.

Some everyday problems in radiation, W. W. Coblentz, Architecture and Building, September, 1923.

Emission tests of paints for decreasing and increasing heat radiation from surfaces, W. W. Coblentz, The American Architect 128, 135 (1925).

The present status of light sources and window materials in therapy, W. W. Coblentz, J. American Institute of Electrical Engineers 48, 397 (1929).

Thermal radiation from materials and selected sources of radiation, W. W. Coblentz, International Critical Tables 5, 242 (1929).

## (d) REFLECTION SPECTRA.

The reflecting power of various metals, W. W. Coblentz, BS Bul. 7, 197 (1911); S 152, 5¢.

The diffuse reflecting power of various substances, W. W. Coblentz, BS Bul. 9, 283 (1912); S 196, 10¢.

Reflecting power of tungsten and stellite, W. E. Coblentz and W. B. Emerson, BS Bul. 14, 307 (1917); S 308, 5¢.

Reflecting power of stellite and lacquered silver, W. W. Coblentz and H. Kahler, BS Sci. Pap. 15, 215 (1919); S 342, 5¢.

Preparation and reflective properties of some alloys of aluminum with magnesium and zinc, R. G. Waltenberg and W. W. Coblentz, BS Sci. Pap. 15, 653 (1920); S 363, 5¢.

Reflecting power of monel metal, stellite and zinc, W. W. Coblentz, BS Sci. Pap. 16, 249 (1920); S 379, 5¢.

Ultraviolet reflecting power of some metals and sulphides, W. W. Coblentz and C. W. Hughes, BS Sci. Pap. 19, 577 (1924); S 493, 5¢.

Reflecting power of beryllium, chromium, and several other metals, W. W. Coblentz and R. Stair, BS J. Research 2, 343 (1929); RP 39, 5¢.

Ultraviolet reflecting power of aluminum and several other metals, W. W. Coblentz and R. Stair, BS J. Research 4, 189 (1930); RP 141, 5¢.

## IV. THERMOELECTRICAL AND PHOTOELECTRICAL PROPERTIES OF MATERIALS.

Thermoelectric properties of tantalum and tungsten, W. W. Coblentz, BS Bul. 6, 107 (1909); S 120, 5¢.

Thermoelectric properties of molybdenum, W. W. Coblentz, BS Bul. 7, 220 (1911); S 152, 10¢.

Photoelectric sensitivity of bismuthinite and various other substances, W. W. Coblentz, BS Bul. 14, 591 (1918); S 322, 5¢.

Some optical and photoelectric properties of molybdenite, W. W. Coblentz, and H. Kahler, BS Sci. Pap. 15, 121 (1919); S 338, 10¢.

The spectral photoelectric sensitivity of silver sulphide and several other substances, W. W. Coblentz and H. Kahler, BS Sci. Pap. 15, 231 (1919); S 344, 5¢.

Spectrophotoelectric sensitivity of thalofide, W. W. Coblentz, BS Sci. Pap. 16, 253 (1920); S 380, 5¢.

Positive and negative photoelectrical properties of molybdenite and several other substances, W. W. Coblentz, BS Sci. Pap. 16, 596 (1920); S 398, 10¢.

Spectrophotoelectrical sensitivity of proustite, W. W. Coblentz, BS Sci. Pap. 17, 179 (1921); S 412, 5¢.

Spectrophotoelectrical sensitivity of agentite, $Ag_2S$, W. W. Coblentz, BS Sci. Pap. 18, 265 (1922); S 446, 5¢.

Spectrophotoelectrical sensitivity of bournonite and pyrargyrite, W. W. Coblentz and J. F. Eckford, BS Sci. Pap. 18, 353 (1922); S 451, 10¢.

Spectrophotoelectrical sensitivity of some halide salts of thallium, lead, and silver, W. W. Coblentz and J. F. Eckford, BS Sci. Pap. 18, 489 (1922); S 456, 5¢.

Various photoelectrical investigations, W. W. Coblentz, BS Sci. Pap. 18, 585 (1922); S 462, 10¢.

Some new thermoelectrical and actino-electrical properties of molybdenite, W. W. Coblentz, BS Sci. Pap. 19, 375 (1924); S 486, 10¢.

Photoionization of caesium vapor, F. L. Mohler, C. Boeckner, R. Stair and W. W. Coblentz, Science 69, 479 (1929).

## V. VISIBILITY OF RADIATION; NOCTURNAL RADIATION; PHOTOCHEMICAL ACTION OF RADIATION.

Relative sensibility of the average eye to light of different colors and some practical applications to radiation problems, W. W. Coblentz and W. B. Emerson, BS Bul. 14, 166 (1917); S 303, 10¢. Abstr. American J. Physiolog. Optics 1, 174 (1920).

Luminous radiation from a black body and the mechanical equivalent of light, W. W. Coblentz and W. B. Emerson, BS Bul. 14, 225 (1917); S 305, 5¢.

The exudation of ice from stems of plants, W. W. Coblentz, US Mo. Weather Review 42, 490 (1914); Jour. Frank. Inst., November, 1914; Scientific Monthly, April, 1916; American Forests and Forest Life, (Frost Flowers), 31, 682 (1925).

Data on ultraviolet solar radiation and solarization of window materials, W. W. Coblentz and R. Stair, BS J. Research 3, 629 (1929); RP 113, 15¢.

Ultraviolet transmission changes in glass as a function of the wavelength of the radiation stimulus, W. W. Coblentz and R. Stair, BS J. Research 13, 773 (1934); RP 744, 5¢.

A comparison of photoelectric cells and the eye, W. W. Coblentz, American J. of Physiological Optics, 1, 41 (1920).

Cold light, W. W. Coblentz, The Scientific American, p. 316, October, 1927.

A physical study of the fire fly, W. W. Coblentz, Publ. No. 164, Carnegie Institution of Washington, 1911.

Nocturnal radiation measurements (thermopile by Coblentz), H. H. Kimball, Mo. Weather Rev., 46, 57 (1918).

A proposed method for the photometry of lights of different colors, III, (Radiometric data by Coblentz), Irwin G. Priest, Phys. Rev. 10, 208 (1917).

Discussion of Mr. Reeves' paper on the visibility of radiation, Trans. Illum. Eng. Soc. 13, 108 (1918).

The restoration of solarized ultraviolet transmitting glasses by heat treatment, A. Q. Tool and R. Stair, BS J. Research, 7, 357 (1931); RP 345, 10¢.

## VI. GERMICIDAL AND ERYTHEMOGENIC ACTION OF RADIATION.

A radiometric investigation of the germicidal action of ultraviolet radiation, W. W. Coblentz and H. R. Fulton, BS Sci. Pap. 19, 641 (1924); S 495, 20¢.

The fungicidal action of ultraviolet radiation, H. R. Fulton and W. W. Coblentz, J. Agr. Research 38, 159 (1929).

The spectral erythemic reaction of the untanned human skin to ultraviolet radiation, W. W. Coblentz, R. Stair and J. M. Hogue, BS J. Research 8, 541 (1932); RP 433, 5¢.

Data on the spectral erythemic reaction of the untanned human skin to ultraviolet radiation, W. W. Coblentz and R. Stair, BS J. Research 12, 13 (1934); RP 631, 5¢.

## VII. PRELIMINARY COMMUNICATIONS, SUMMARY REPORTS AND MISCELLANEOUS PAPERS DEALING WITH APPLICATIONS OF RADIOMETRY TO ILLUMINATION AND MEDICINE

These papers are classified under the titles of the publications in which they are printed, and, unless otherwise indicated, are by W. W. Coblentz.

### American J. Electrotherapeutics and Radiology.

Some physical characteristics of the radiation from quartz mercury arc lamps, 39, October, 1921.

A radiometric investigation of the germicidal action of ultraviolet radiation, W. W. Coblentz and H. R. Fulton, 43, 251 (1925).

A comparison of the ultraviolet component radiation from carbon and mercury arc lamps and from the sun, 43, 445 (1925).

### Astrophysical J.

Preliminary communication on the infrared absorption spectra of organic compounds, 20, 207 (1904).

Handbuch der Spektroskopie, by H. Kayser; A Review, 22, 281 (1905).

Regular and diffuse reflection, 25, 232 (1907).

New measurements of stellar radiation 55, 20 (1922).

Measurements of the radiation of the solar corona of January 24, 1925, H. T. Stetson and W. W. Coblentz, 62, 128 (1925).

Investigations of the corona at the Sumatra eclipse of January 14, 1926, H. T. Stetson, W. W. Coblentz, W. Arnold, and W. A. Spurr, 66, 65 (1927).

Planetary temperatures derived from water-cell transmissions, D. H. Menzel, W. W. Coblentz and C. O. Lampland, 63, 177 (1926).

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